

INTEGRATING SUSTAINABLE DESIGN PRINCIPLES INTO THE NATIONAL RENEWABLE ENERGY LABORATORY'S (NREL) NEW LAB BUILDING AND A 25-YEAR CAMPUS PLAN

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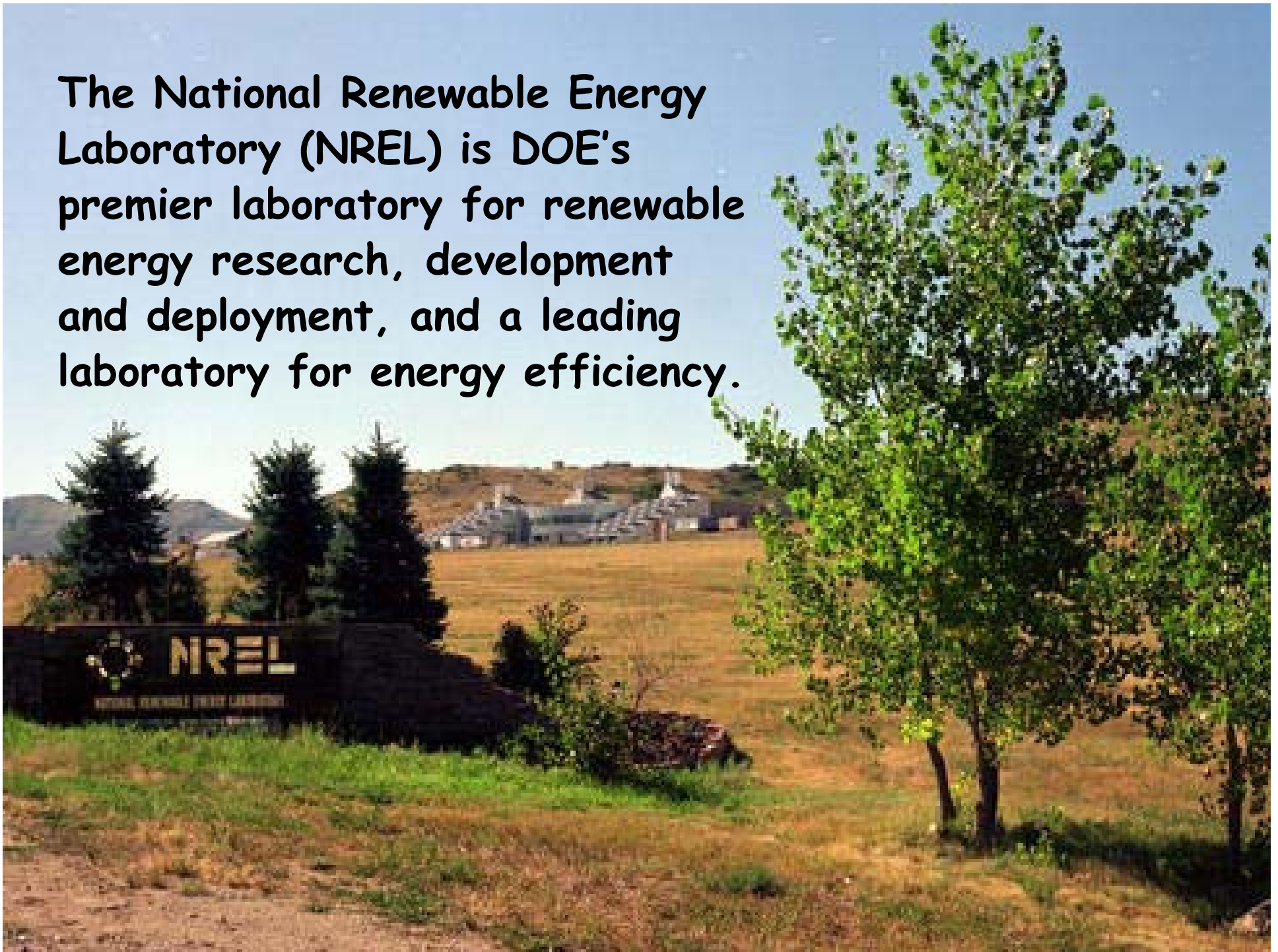
LABS FOR THE 21ST CENTURY

Presentation Outline

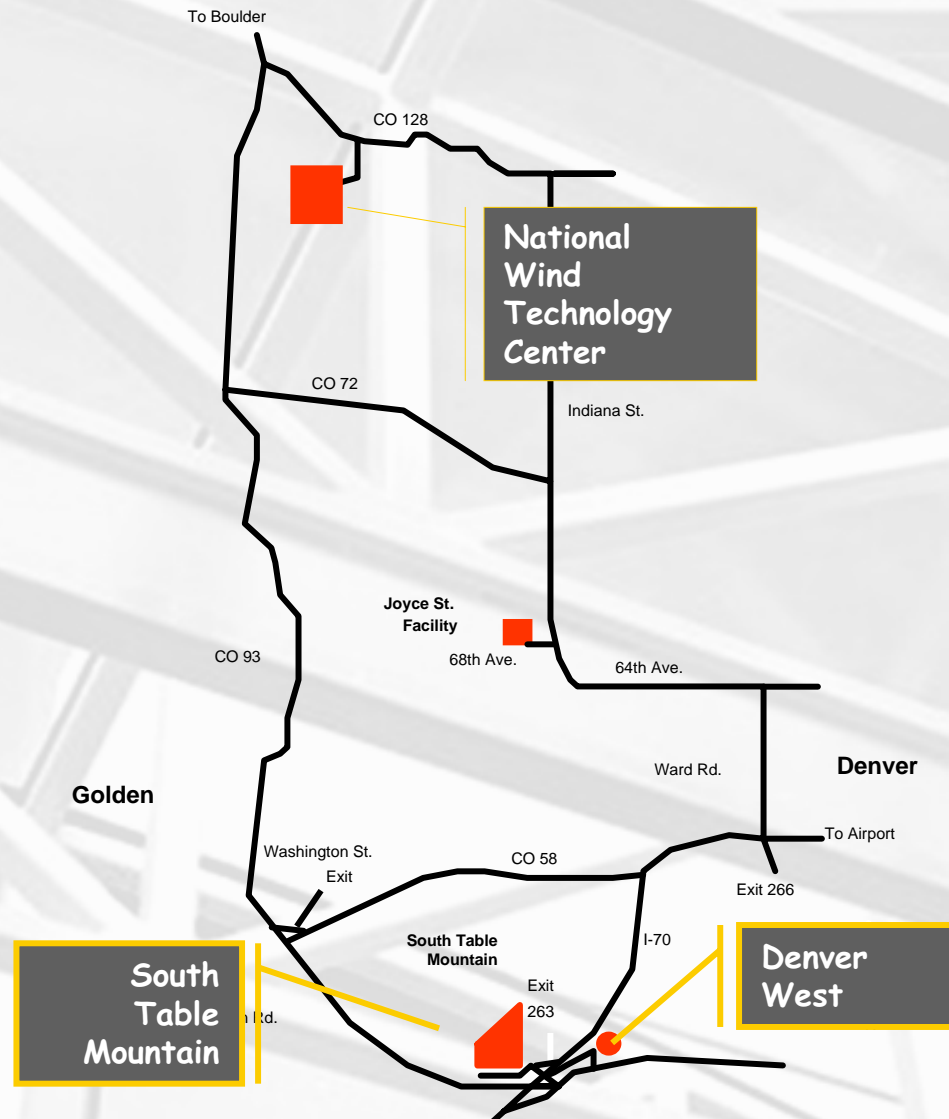
- Science and Technology Facility (STF) - the evolution of design to date
- 25-year campus plan - the planning process
- The integration of the two activities
- Lessons learned so far



The National Renewable Energy Laboratory (NREL) is DOE's premier laboratory for renewable energy research, development and deployment, and a leading laboratory for energy efficiency.



Current NREL Sites & Facilities





**South
Table
Mountain**



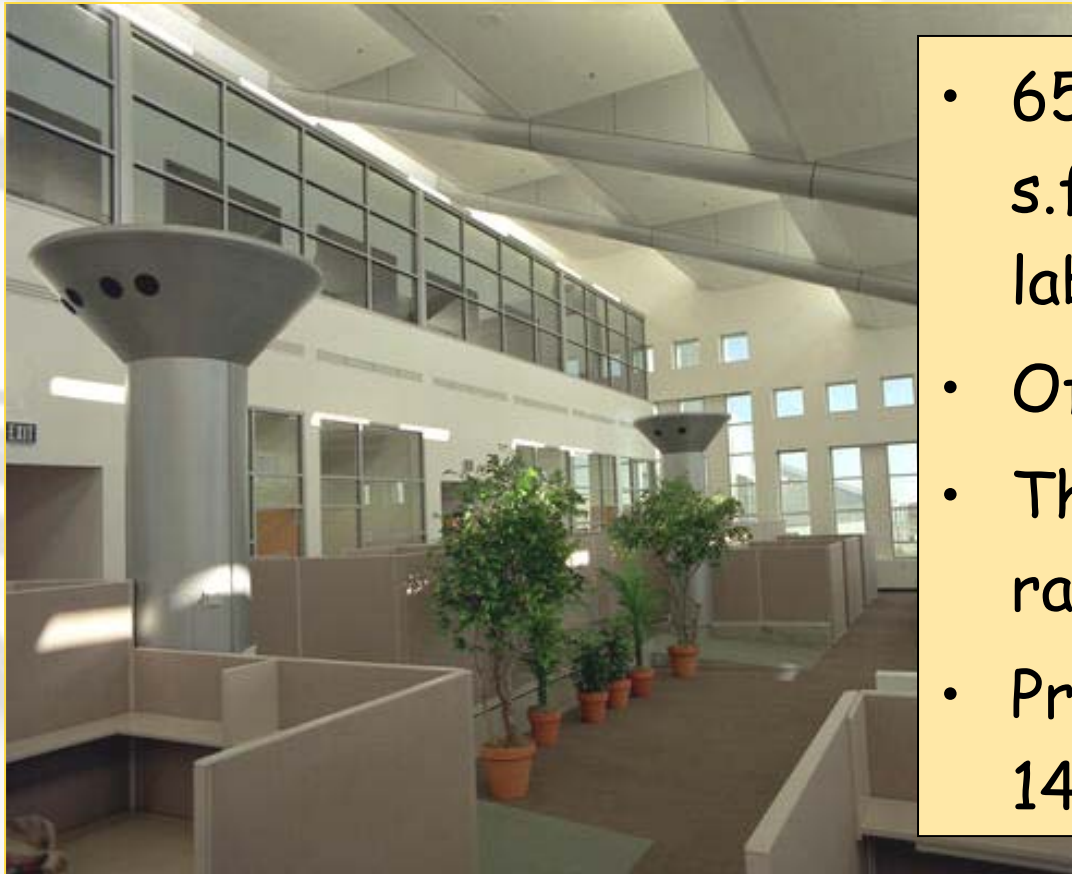
**National Wind
Technology Center**



Denver West

Science And Technology Facility (STF)

The STF will provide the PV R&D community a facility to fully characterize and integrate the materials and processes critical to industry needs.



- 65,000 s.f with 30,000 s.f. devoted to laboratories
- Offices for 55 staff
- The goal is for LEED gold rating
- Proposed budget - 14.5M-17.5M

STF Location on NREL's Campus

- Conservation Easement
- Environmentally Restrictive
- Mesa Toe Building Zone

Science and
Technology
Facility

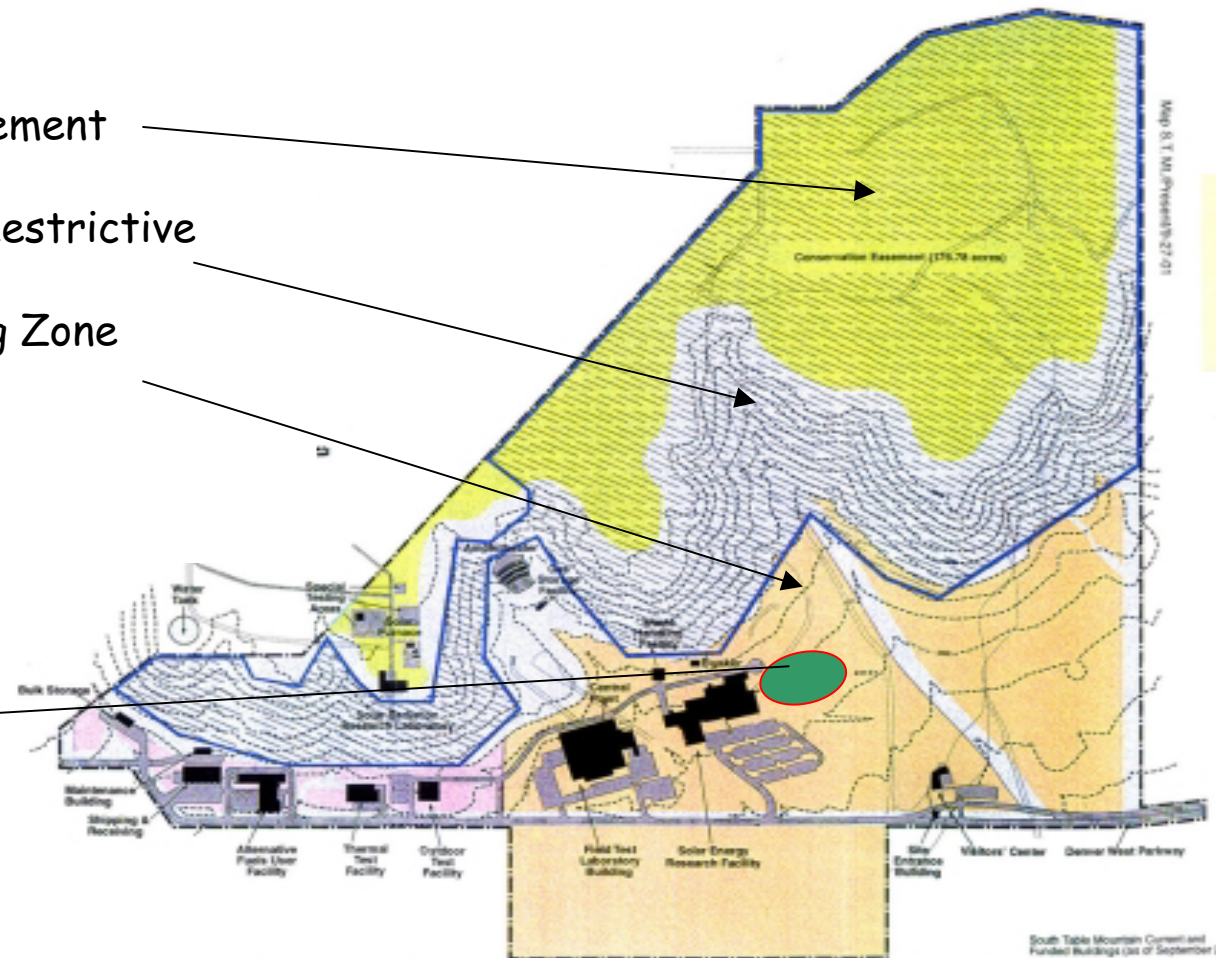


Figure 3: South Table Mountain Current and Funded Buildings

Steps in the Design Process

- Developed a conceptual design
- Held a design charrette to focus on sustainability issues
- Developed a revised conceptual design
- Used a competitive process to select A\E
- Currently completed 50% of schematic design



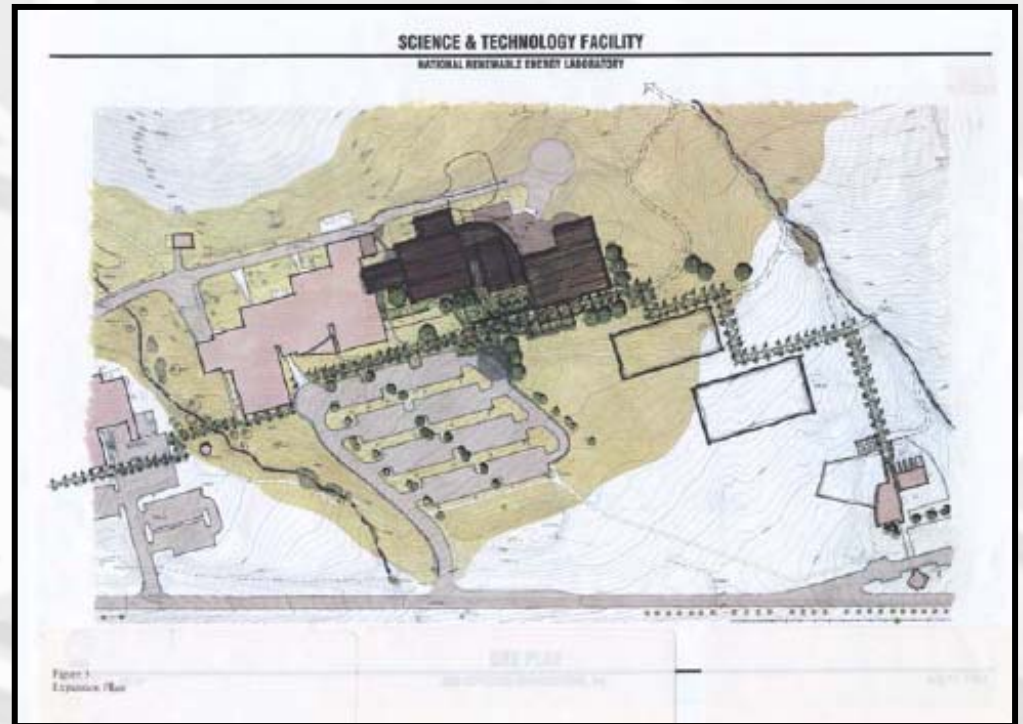
First Conceptual Design

- A one story building
- User requested a specialized lab for PV research. A/E responded with cylindrical shape that became a form driver
- Daylighting offices and labs also a form driver
- Energy efficiency 40% less than ASHRAE 90.1 base case (excluding plug loads)



Design Charrette

- Focus on issues to enhance sustainability
- Brought in national level expertise
- Charrette was an opportunity to discuss organizational values
- Key recommendation was for a 2-story design that offers a smaller footprint, more efficient HVAC, a long-term plan for greater growth flexibility and can be daylight



Charrette Drawing

Second Conceptual Design

- Responded to the charrette recommendations
- Two story
- 40% more energy efficient than base case
- 100% daylit in office areas and good daylighting in labs



Science And Technology Facility

2-story concept (Feb.2002)

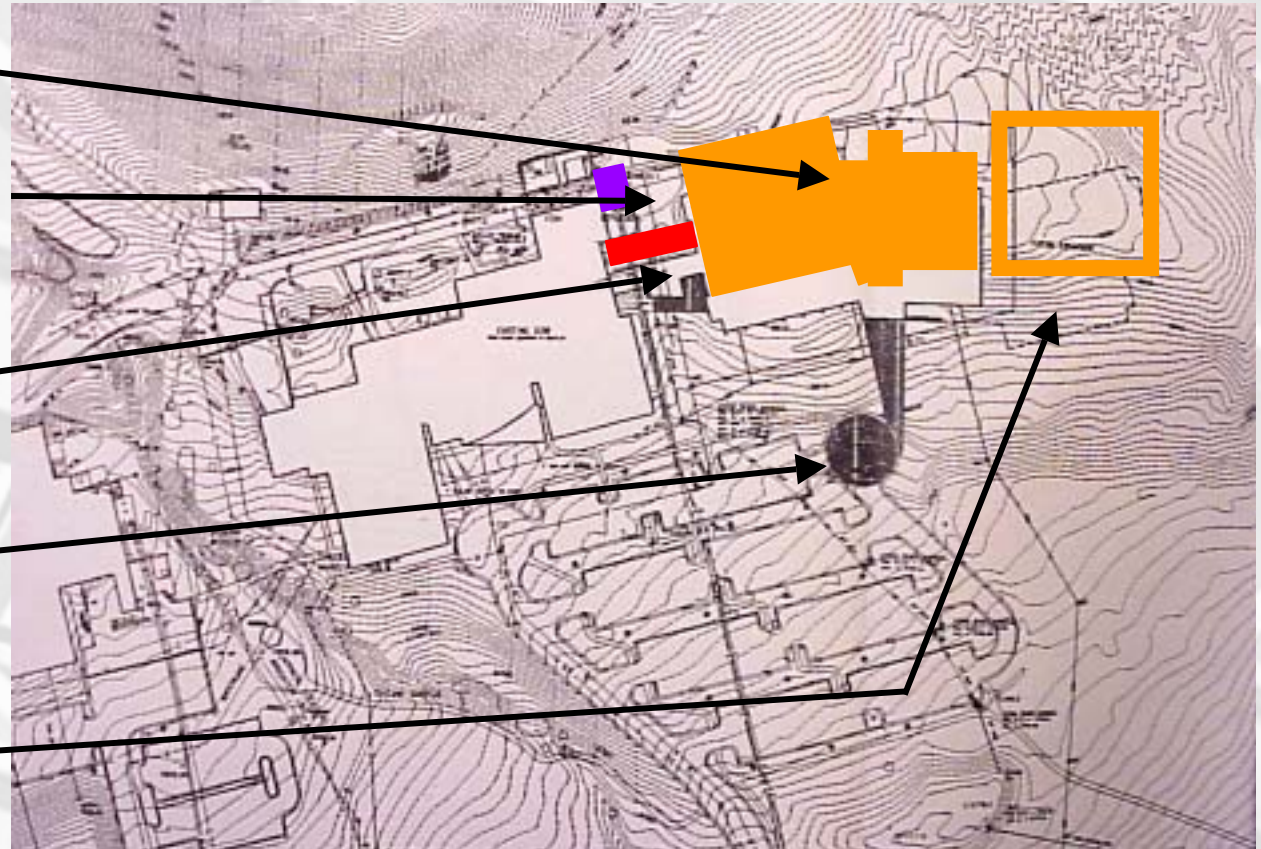
2-story concept to
minimize land usage

Expand SERF Central
Plant

Functional connection
to the SERF

Utilize existing
parking lot

Plan for expansion
to the east



Competitive Process to Select A/E

A/E Requirements:

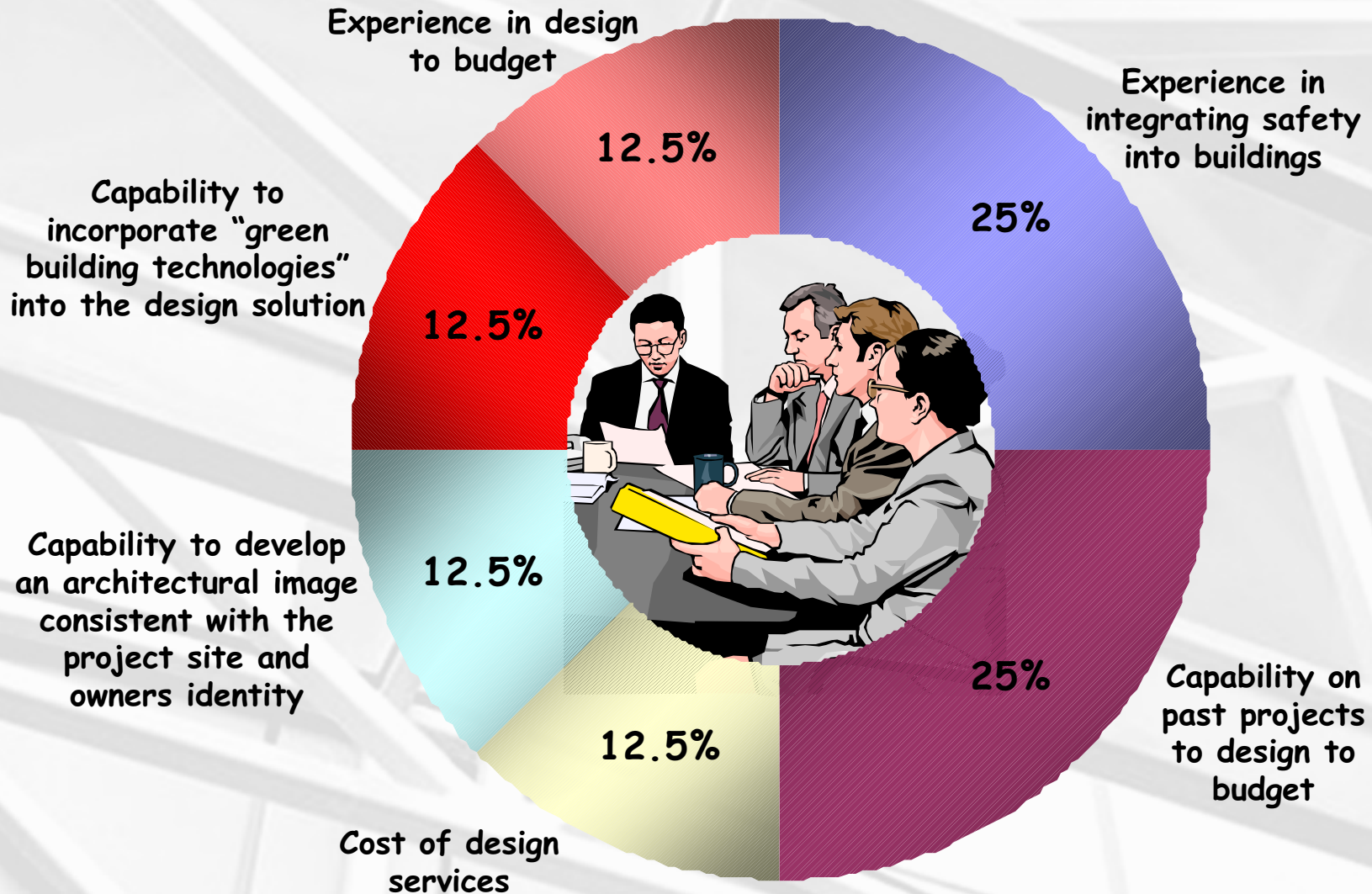
- Schematic design
- Design development
- Construction management
- Energy and daylighting analysis
- Sustainable design report
- LEED assessment*
- Plume dispersion analysis



The RFP included descriptions of our energy efficiency recommendations in support of the energy analysis report and included a description of sustainable design and development from our perspective.

*The LEED goal for the project was stated as Gold.

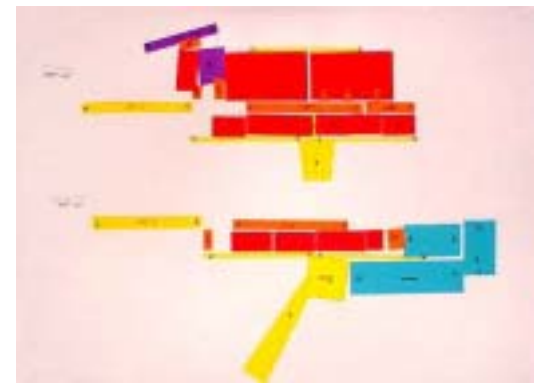
Selection Criteria for A/E



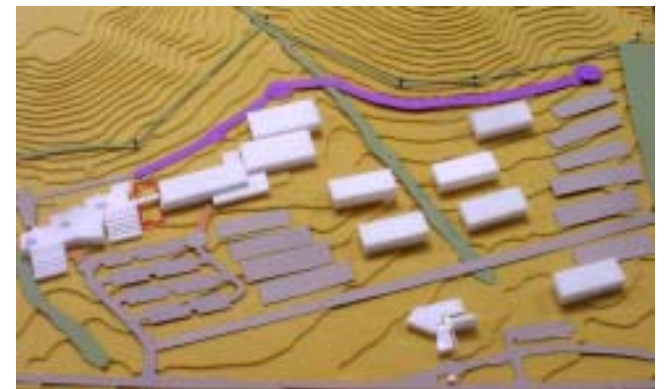
Method to provide a regional presence and knowledge of the locality of the project: pass/fail

A/E SELECTION

- NREL interviewed seven firms
- Selected the SmithGroup from Phoenix, AZ
- They work on-site one week a month using an open participatory design process.



Evaluating site options



Studying Adjacencies

Achieving the right balance is
really the bottom line

Quantity

Total Gross
Square Feet

Quality

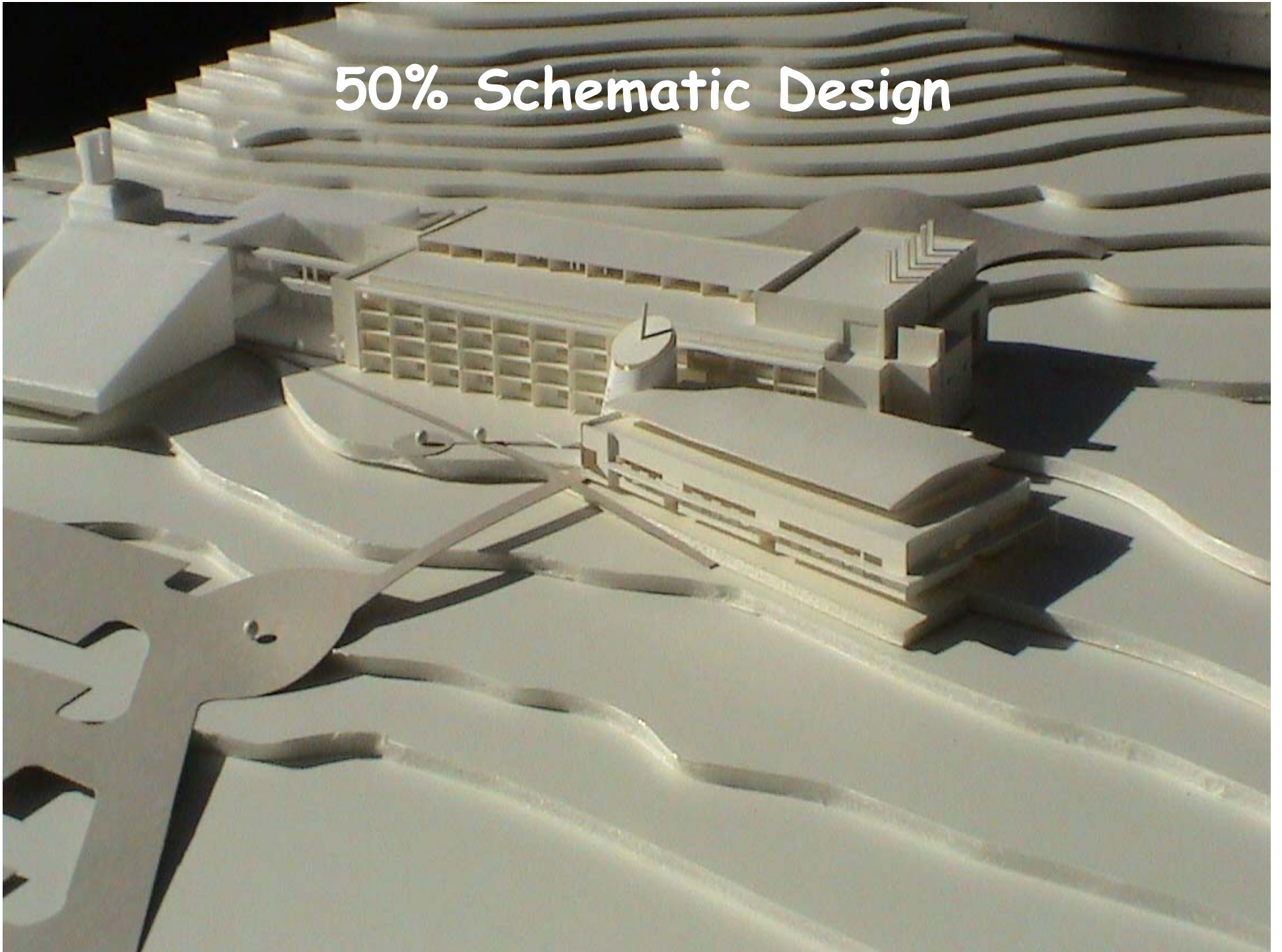
NREL Construction
Standards
NREL User's Input
Document
LEED Criteria

Construction Budget

\$15 M



50% Schematic Design

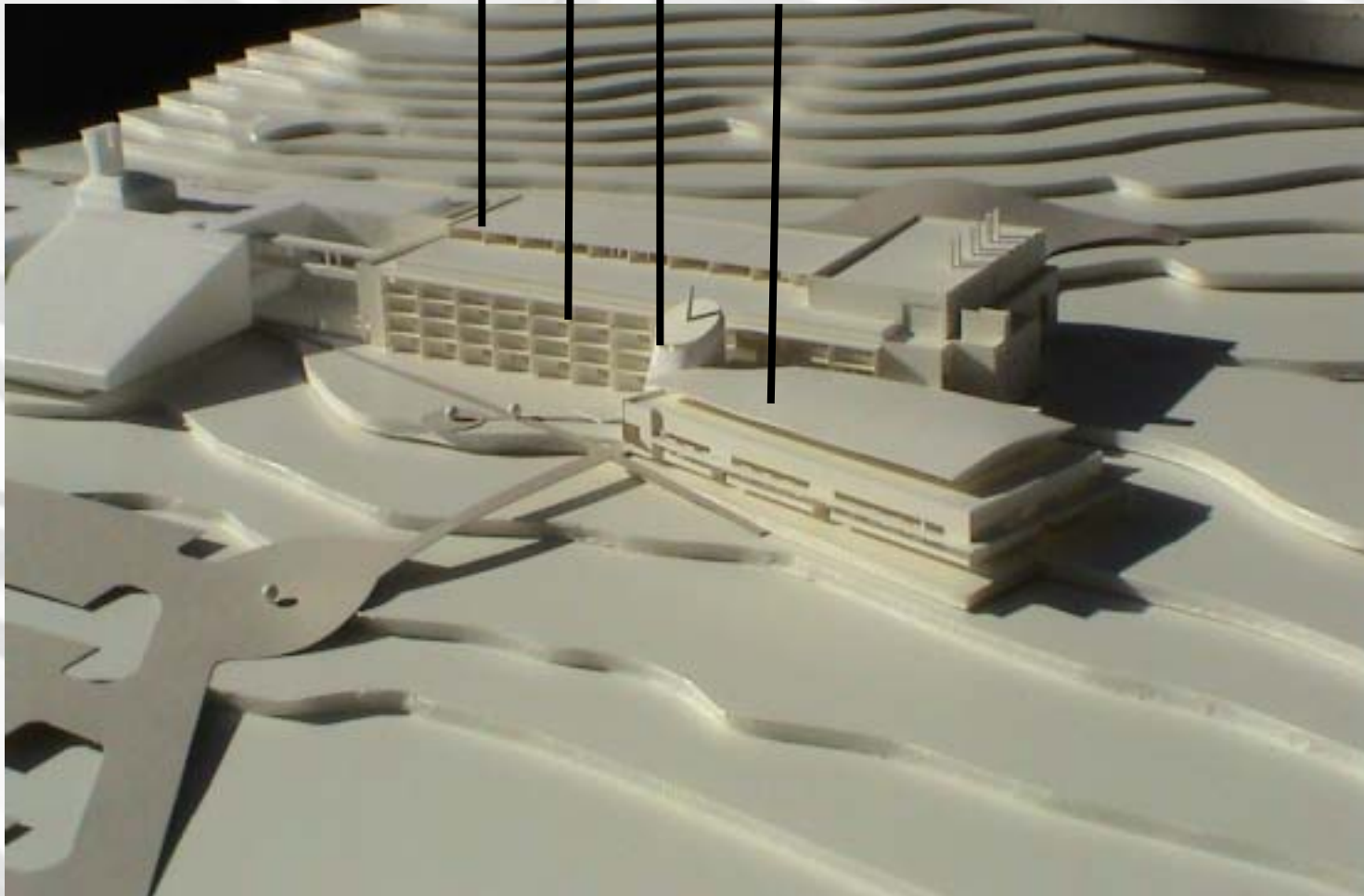


PDIL

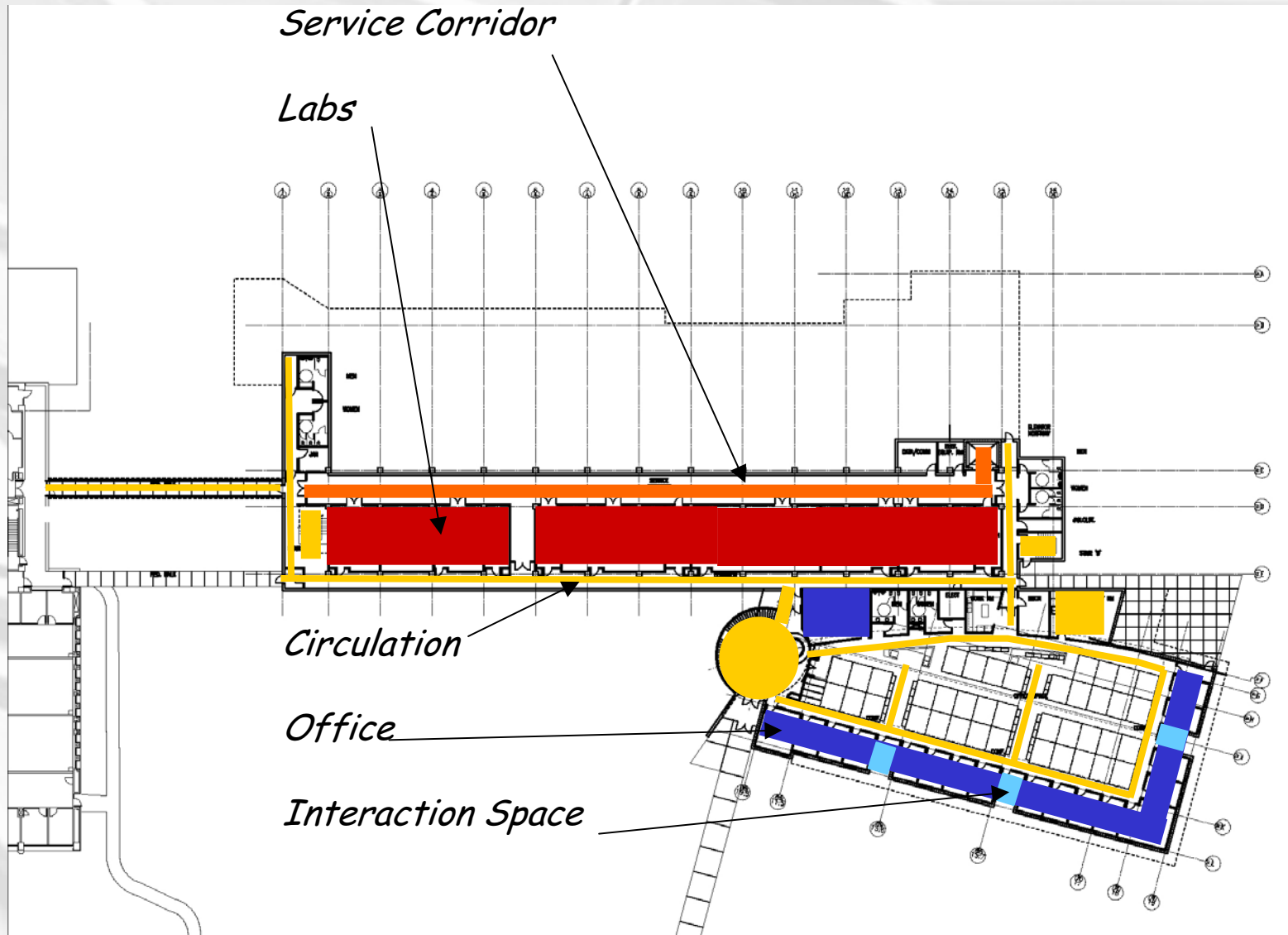
Lab/Corr

Lobby

Office



50% Schematic Design

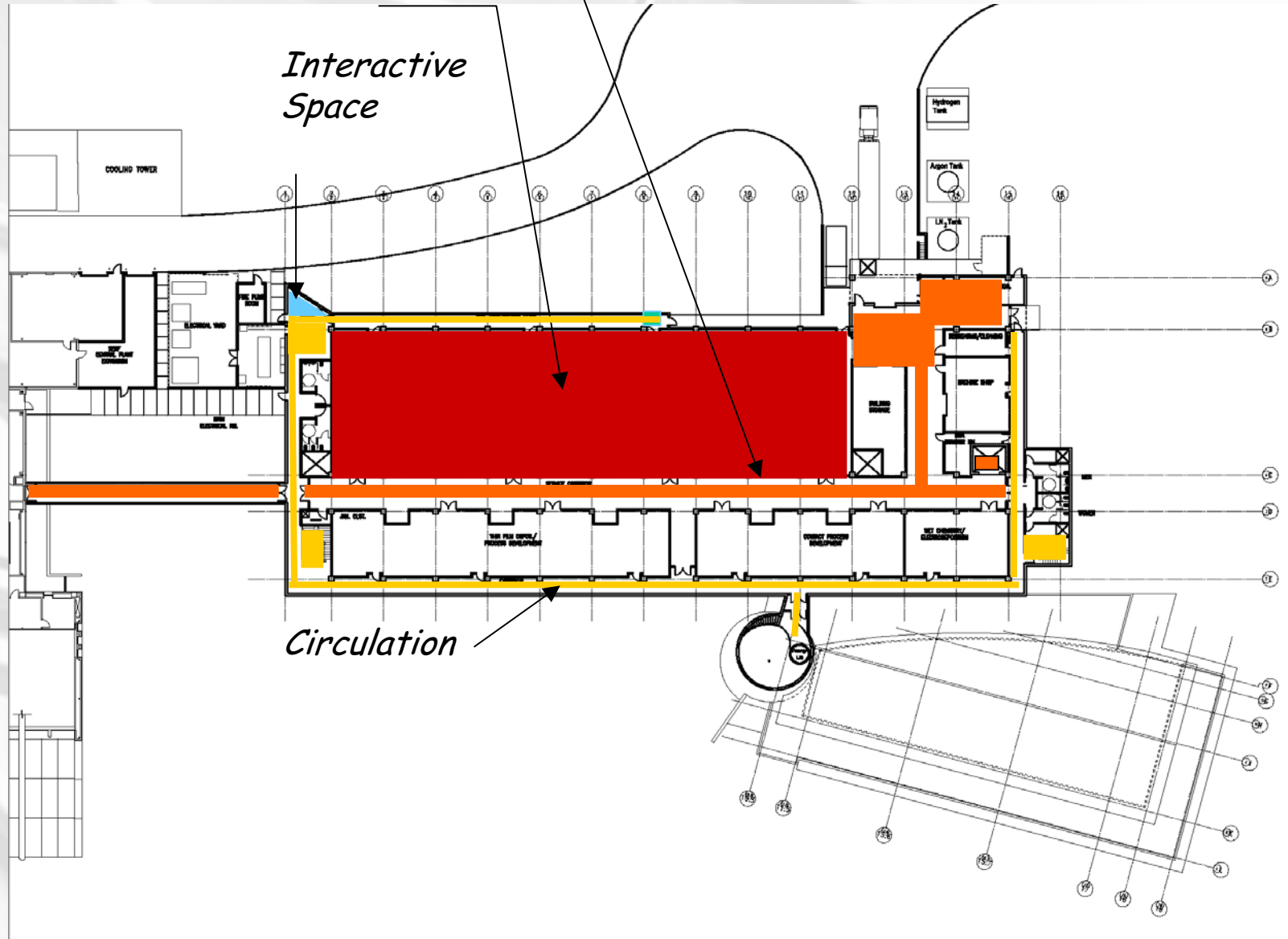


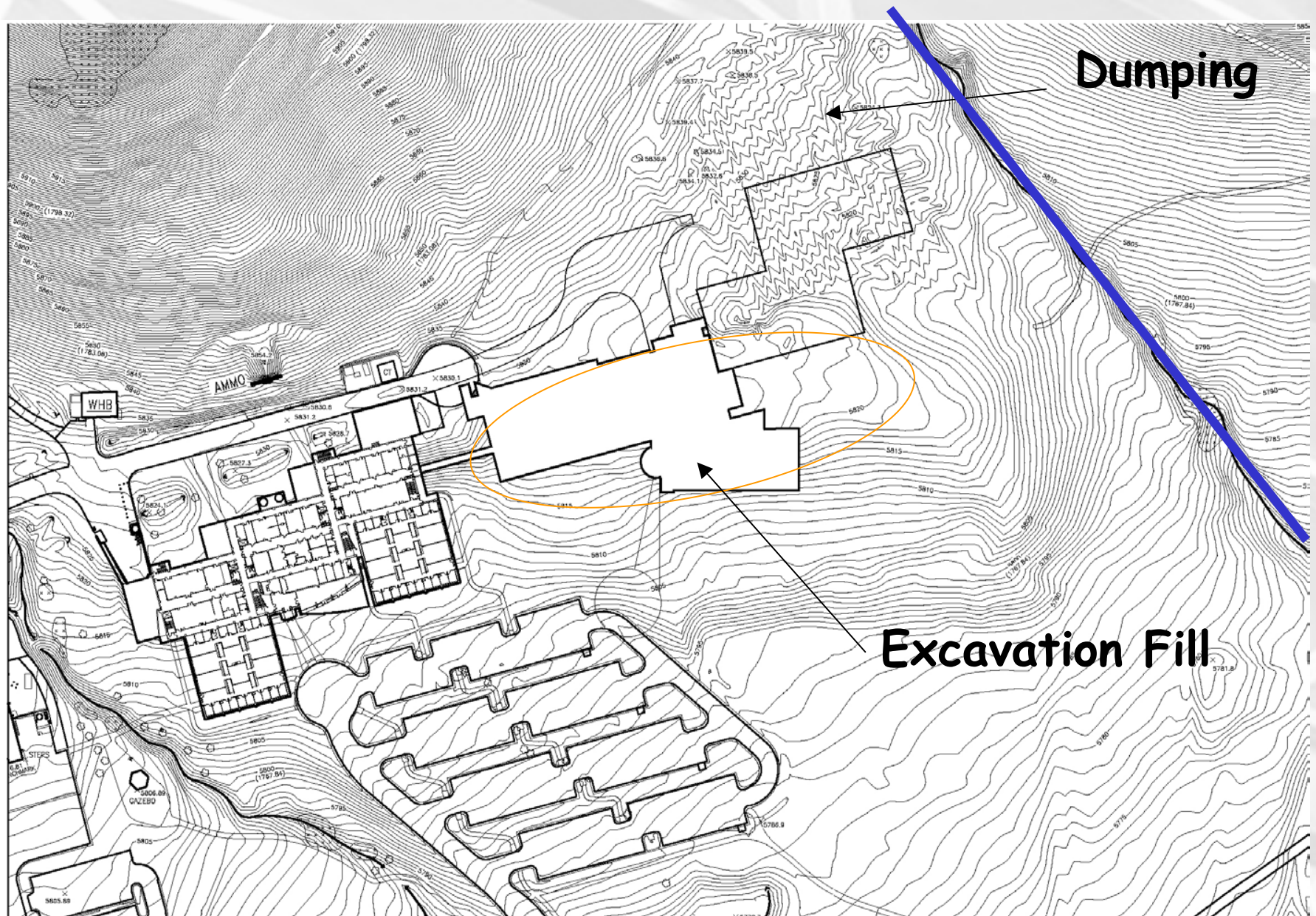
Service Corridor

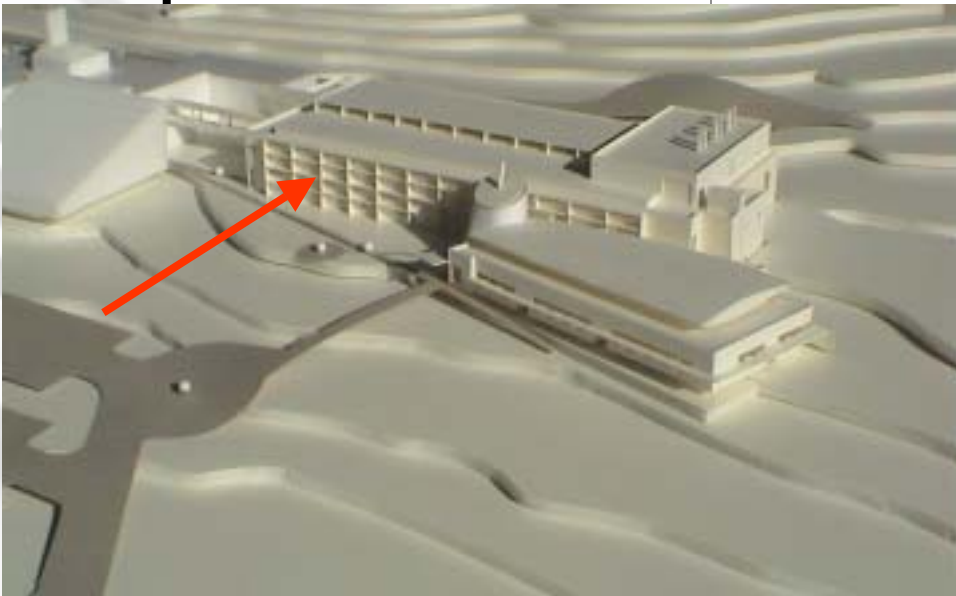
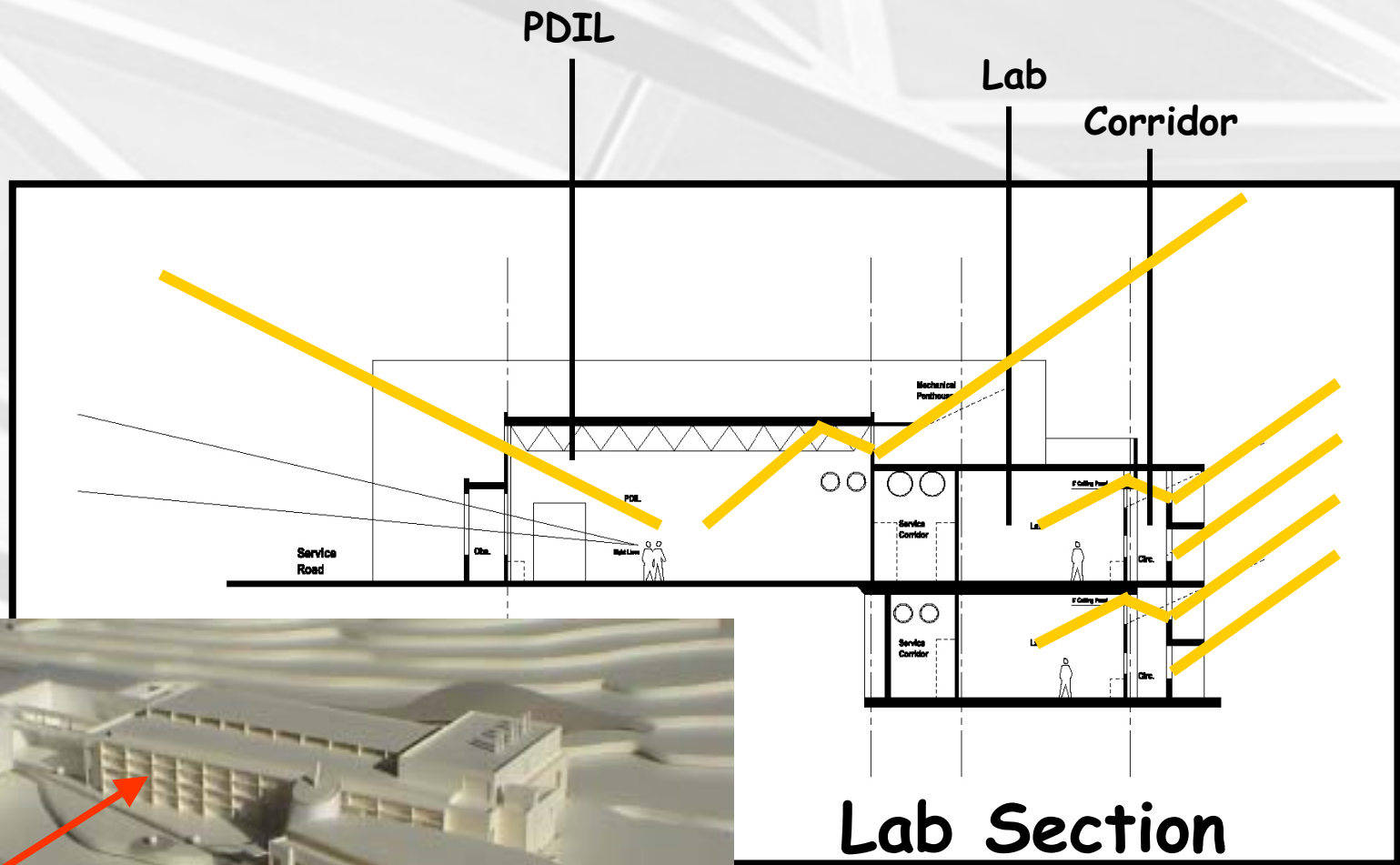
PDIL

*Interactive
Space*

Circulation

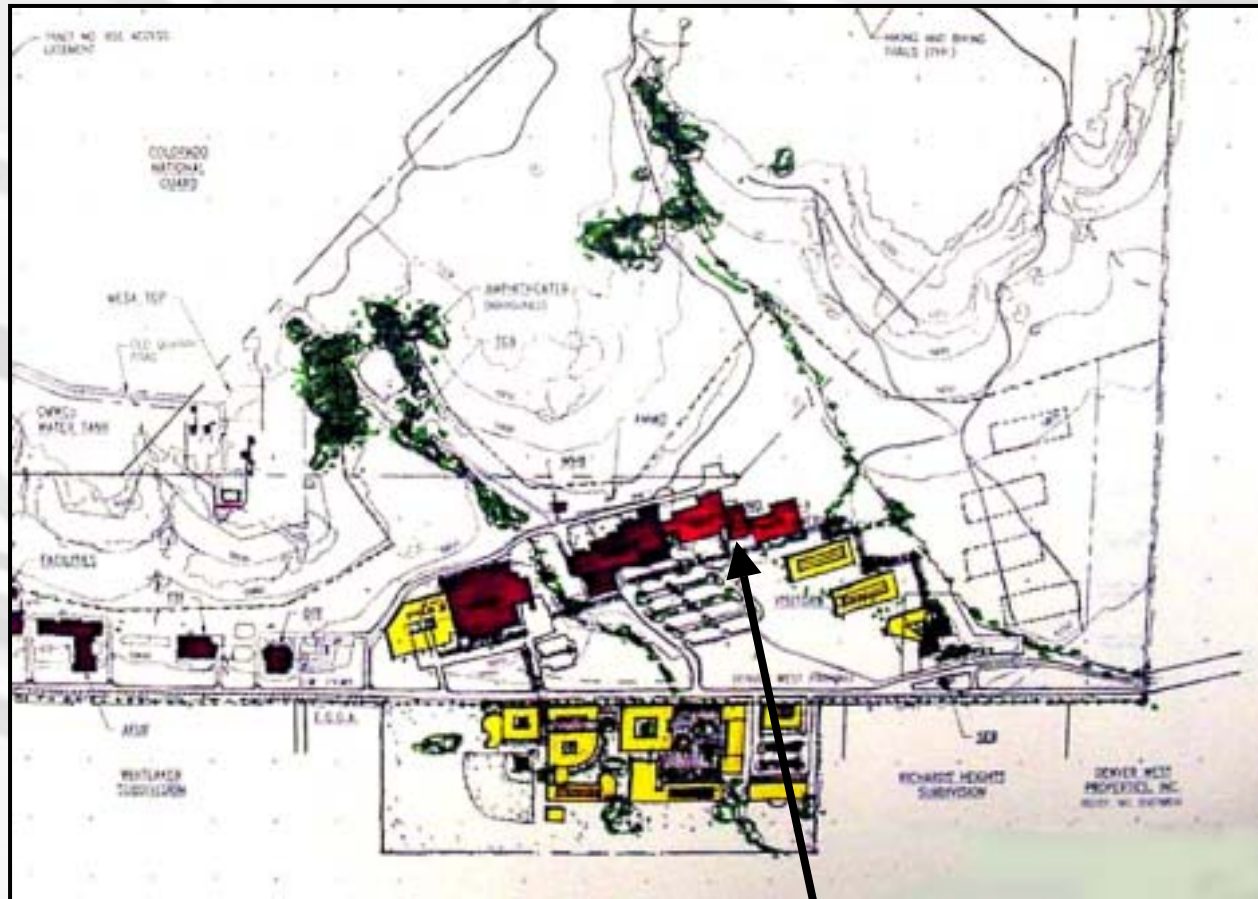






The Design Charrette also stimulated our need to develop a shared vision for our campus.

Sketch of a concept from the design charrette



Science and Technology Facility

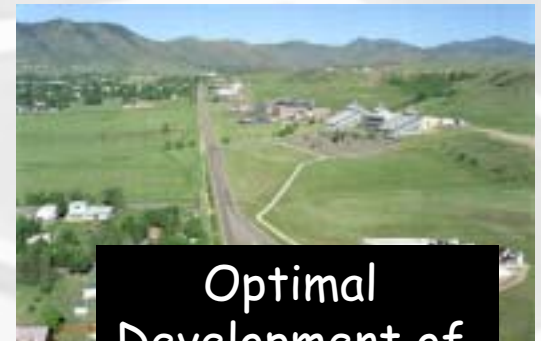
Master Site Planning Project

The objective is a 25-year General Development Plan that communicates a single unified vision for how NREL intends to develop its physical facilities integrating these three factors

Surrounding Community
Interactions



Future Mission
Directions



Optimal
Development of
Physical Sites



Expectations from Campus Planning

- **Convey** NREL vision and leadership.
- **Reflect and communicate** NREL image and values.
- **Ensure** linkage between future mission requirements and appropriate physical facilities.
- **Strengthen** NREL capital budget rationale
- **Enhance** staff productivity, attract top performers
- **Determine and communicate** intended site usage, physical layouts and buildouts
- **Provide** a planning context for individual facilities and projects
- **Inform** future Environmental Assessments
- **Establish a balance** between potentially conflicting design values

Key Steps in the Process

Do our internal homework

- Form internal working group
- Focus on 5 key tasks
 1. Define our site planning values, goals and expectations
 2. Characterize our future direction
 3. Understand the external factors that will impact our site
 4. Hold focus group meetings with staff to understand their perceptions, values and goals for site
 5. Hire a site planner



A Sampling of Views from the Staff Focus Groups



Our campus should reflect our mission.

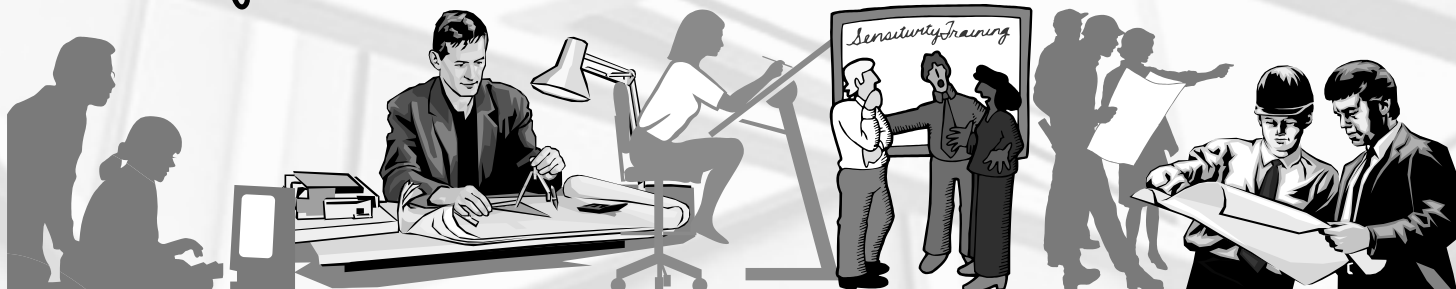
Protect and restore the natural environment

- Consolidate to 1 campus
- Efficient internal building design
- Balance development with the environment
- Better pedestrian connectivity
- More informal interaction spaces
- Preserve views and use natural light in buildings



Lessons Learned

- An organization must understand the balance and tradeoffs needed to meet the users requirements; budget; quality issues (sustainable design, and architectural amenities).
- The design charrette provided an opportunity to discuss organization values as it impacts these tradeoffs.
- We used the A/E selection criteria as a way to define the hierarchy of our organizational values.
- We involved individuals representing each of these perspectives on the A/E selection board.
- With the firms that we selected, we are working together to achieve our objectives.



Lessons Learned

- Ideally, the site plan should be done prior to the major new campus building but a new lab building could be the catalyst to re-look at your entire campus
- Site planning won't be successful without buy-in from all stakeholders so they need to be part of the process
- A goals, strategy and shared values document and the criteria to select a planner can be used as tools to achieve sustainability goals

